



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,226	09/18/2003	Donald Craig Foster	AMKOR-089A	7010

7663 7590 08/14/2006

STETINA BRUNDA GARRED & BRUCKER  
75 ENTERPRISE, SUITE 250  
ALISO VIEJO, CA 92656

EXAMINER
----------

IM, JUNGHWAN M

ART UNIT	PAPER NUMBER
----------	--------------

2811

DATE MAILED: 08/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/667,226

Applicant(s)

FOSTER, DONALD CRAIG

Examiner

Junghwa M. Im

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7 and 11-16 is/are rejected.
- 7) ☐ Claim(s) 5, 6, 8-10 and 17-19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji et al. (US 5497032), hereinafter Tsuji in view of Hsu et al. (US PUB 2004/0089926), hereinafter Hsu.

Claims 1-3 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsuji.

Regarding claim 1, Fig. 3C of Tsuji shows an interposer for use in a semiconductor package, the interposer comprising:

an interposer body (46, 46A, 48) molded from a dielectric material (refractory-glass), the interposer body defining opposed top and bottom surfaces, an outer peripheral edge, and an inner peripheral edge;

a die pad (42) having opposed top and bottom surfaces and a peripheral edge, the die pad being embedded in the inner peripheral edge of the interposer body the die pad being embedded within the interposer body such that the bottom surface of the die pad is exposed in and substantially flush with the bottom surface of the interposer body, the inner peripheral edge of the interposer body and the top surface of the die pad collectively defining a cavity (49a) of the interposer; and

Art Unit: 2811

a plurality of electrically conductive interposer leads (45) embedded within the top surface of the interposer body and at least partially exposed therein, each of the interposer leads defining a land (a wire connecting portion);

the interposer body forming a non-conductive barrier between each of the interposer leads and between the interposer leads and the die pad.

Fig. 3C of Tsuji shows most aspect of the instant invention except that an exposed land is substantially contiguous with the bottom surface of the interposer body. Fig. 3 of Hsu shows the exposed lands (10) is contiguous with the die pad while being flushed with the dielectric layer (30).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Hsu into the device of Tsuji in order to have the exposed land is substantially contiguous with the bottom surface of the interposer body to reduce the package size.

Regarding claim 2, Fig. 3C of Tsuji shows that each of the interposer leads includes a finger portion having a top surface, which is exposed in and substantially flush with the top surface of the interposer body.

Regarding claim 3, Fig. 3C of Tsuji shows that the finger portion of each of the interposer leads has an interior terminal end which extends to the cavity and an exterior terminal end which extends beyond the outer peripheral edge of the interposer body; and each of the interposer leads further includes a protuberance which projects downwardly from the finger portion in close proximity to the exterior terminal end thereof the protuberance being oriented outward of the outer peripheral edge of the interposer body and defining the land (a flatten end portion).

Art Unit: 2811

Regarding claim 7, Fig. 3C of Tsuji shows that the interposer body includes an integral pedestal [46A, 48], which is disposed on the top surface thereof and extends over portions of each of the interposer leads.

Claims 11-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fig. 3C of Tsuji in view of Fig. 11B of Tsuji

Regarding claim 11, Fig. 3C of Tsuji shows an interposer for use in a semiconductor package, the interposer comprising:

- a die pad (42) having opposed top and bottom surfaces and a peripheral edge;

- a layer of adhesive (43) attached to the top surface of the die pad, and extending along the peripheral edge thereof, the layer and the top surface of the die pad collectively defining a cavity (49a) of the interposer.

- a plurality of electrically conductive interposer leads (45) embedded within the top surface of the interposer body and at least partially exposed therein, each of the interposer leads defining a land (an outer end portion)

Fig. 3C of Tsuji shows most aspect of the instant invention except a layer of adhesive tape (46) having a first surface attached to the top surface of the die pad (42) and an interposer leads (45) attached to the second surface of the adhesive tape. Fig. 11B of Tsuji shows a layer of adhesive tape (136) having a first surface attached to the top surface of the die pad (135) and an interposer leads (140a) attached to the second surface of the adhesive tape.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Fig. 11B of Tsuji into the device of Tsuji in order to

Art Unit: 2811

have a layer of adhesive tape having a first surface attached to the top surface of the die pad and an interposer leads attached to the second surface of the adhesive tape for a embedded configuration of the leads.

Regarding claim 12, Fig. 3C of Tsuji shows each of the interposer leads (Hiyoshi; [51]) includes a finger portion having a top surface which extends in spaced, generally parallel relation to the top surface of the die pad and is electrically isolated therefrom by the layer of adhesive (43).

Regarding claim 13, Fig. 3C of Tsuji shows that the finger portion of each of the interposer leads has an interior terminal end which extends to the cavity and an exterior terminal end which extends beyond the outer peripheral edge of the interposer body; and each of the interposer leads further includes a protuberance which projects downwardly from the finger portion in close proximity to the exterior terminal end thereof the protuberance being oriented outward of the outer peripheral edge of the interposer body and defining the land (a flatten end portion).

Regarding claim 15, Fig. 3C of Tsuji shows that the finger portion of each of the interposer leads has an interior terminal end which extends to the cavity and an exterior terminal end which extends beyond the outer peripheral edge of the interposer body; and each of the interposer leads includes a downset within the finger portion in close proximity to the exterior terminal end, the downset defining the land.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji and Hsu as applied to claim 3 above, and further in view of Kishimoto et al. (US 6552421), hereinafter Kishimoto.

Regarding claim 4, combined teachings of Tsuji and Hsu show most aspect of the instant invention except “the land of each of the interposer leads, the bottom surface of the die pad, and the bottom surface of the interposer body extend in generally co-planar relation to each other.” Fig. 1 of Kishimoto shows that the land of each of the leads (5) and the bottom surface of the die pad (3) extend in generally co-planar relation to each other. Therefore, the combined teachings of Tsuji, Hsu and Kishimoto would show that the land of each of the interposer leads, the bottom surface of the die pad, and the bottom surface of the interposer body extend in generally co-planar relation to each other.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kishimoto into the device of Tsuji and Hsu in order to have the land of each of the interposer leads, the bottom surface of the die pad, and the bottom surface of the interposer body extending in generally co-planar relation to each other for a compact package.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji in view of Hsu and Kishimoto

Regarding claim 20, Fig. 3C of Tsuji shows an interposer for use in a semiconductor package, the interposer comprising:

a die pad (42) having opposed top and bottom surfaces and a peripheral edge;

Art Unit: 2811

a plurality of electrically conductive interposer leads (45), each of the interposer leads including a finger portion and a land which projects downward and has a bottom terminal surface; and

a means (46, 46A, 48) for forming a non-conductive barrier between each of the interposer leads and between the interposer leads and the die pad.

Fig. 3C of Tsuji shows most aspect of the instant invention except that an exposed land is substantially contiguous with the bottom surface of the interposer body. Fig. 3 of Hsu shows the exposed lands (10) is contiguous with the die pad while being flushed with the dielectric layer (30).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Hsu into the device of Tsuji in order to have the exposed land is substantially contiguous with the bottom surface of the interposer body to reduce the package size.

The combined teachings of Tsuji and Hsu show most aspect of the instant invention except "a bottom terminal surface which is generally coplanar with the bottom surface of the die pad." Fig. 1 of Kishimoto shows that a bottom terminal surface (5) which is generally coplanar with the bottom surface of the die pad (3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kishimoto into the device of Tsuji and Hsu in order to have a bottom terminal surface of the land being generally coplanar with the bottom surface of the die pad for a compact package.



Art Unit: 2811

Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuji and Tsuji as applied to claims 13 and 15 above, and further in view of Kishimoto.

Subject matter regarding claims 14 and 16 have been discussed above in claim 4.

***Allowable Subject Matter***

Claims 5-6, 8-10 and 17-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance.

Prior art fails to teach or render obvious singularly or with combinations of elements as set forth in the claims a semiconductor device, including in particular for claim 5, the finger portion of each of the interposer leads having an interior terminal end which extends to the cavity and an exterior terminal end which extends beyond the outer peripheral edge of the interposer body, and each of the interposer leads includes a downset which is formed within the finger portion thereof in close proximity to the exterior terminal end, the downset being partially covered by the interposer body and defining the land which is exposed in the bottom surface of the interposer body.

Prior art fails to teach or render obvious singularly or with combinations of elements as set forth in the claims a semiconductor device, including in particular for claims 8 and 17, a plurality of package leads supported by at least one of the interposer body and the interposer leads; a semiconductor die attached to the top surface of the die pad and electrically connected to at least some of the interposer leads and the package leads; and a package body at least partially

Art Unit: 2811

covering the semiconductor die, the interposer and the package leads such that at least portions of the package leads, the lands of the interposer leads and the bottom surface of the die pad are exposed in the package body.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 2811


however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jmi



EDDIE LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800